Method for realtime localization of inplane and out-of-plane needles from 2D ultrasound

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Technology description

Needle augmentation in three consecutive frames with inplane insertion of a 17G needle in a bovine tissue phantom (I–III) and one frame with out-of-plane insertion of a 17G needle in a porcine shoulder phantom (IV).

Invention Summary

Ultrasound imaging is commonly used to guide placement of needles for biopsies, catheter, drainage, and anesthesia. However, visual artifacts make it difficult to locate the needle in cases of steep insertion angles (40-80 degrees) and depths (9 cm). Hence, there is a need for a method for real-time needle detection.Researchers at Rutgers University developed a novel method for automatically localizing inplane and out-of-plane needles and other surgical tools as moving targets on a dynamic background using 2D ultrasound in real time at steep angles and deep insertions. This method uses logical differencing of adjacent frames to detect the tip of the needle, combined with a Split-Bregman approach to reduce the computational complexity. This software is cohesive with current ultrasound technology for facilitated integration.

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Application area

Medical devices

Medical imaging

Advantages

Locates moving surgical tools at steep insertion angles and depths

Easily integrated into current ultrasound machines

May be applied to other digital imaging techniques

Realtime (65fps) processing speed

Institution

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